

~~-10 to +50°C; and~~

wherein said copolymer P comprises in polymerized form

a) 0.5 to 1.0% by weight of an acidic monomer M1 selected from the group consisting of itaconic acid, a salt of itaconic acid, an anhydride of itaconic acid and a combination thereof, based on a total weight of said copolymer P;

b) 90 to 99.9% by weight of monomers M2 selected from the group consisting of vinylaromatic monomers, esters of ethylenically unsaturated C₃-C₈ monocarboxylic acids with C₁-C₁₂-alkanols, and vinyl esters of aliphatic C₁-C₁₂ monocarboxylic acids, based on the total weight of said copolymer P; and

c) 0.1 to 10% by weight of at least one monomer M3 comprising an urea group, based on the total weight of said copolymer P;

wherein said copolymer P contains no polymerized acrolein;

ii) at least one inorganic pigment

iii) an inorganic filler/extender, and

iv) an auxiliary.

10. (Amended) The emulsion paint according to Claim 9, wherein itaconic acid is the sole acidic monomer M1.

11. (Amended) The emulsion paint according to Claim 9, wherein the monomers M2 are selected from the group consisting of methyl methacrylate, ethyl methacrylate, n-butyl methacrylate, tert-butyl methacrylate, ethyl acrylate, n-butyl acrylate, tert-butyl acrylate and 2-ethylhexyl acrylate.

13. (Amended) The emulsion paint according to Claim 9, wherein said aqueous dispersion of the copolymer P is obtained by free-radical aqueous emulsion polymerization of the monomers M using a monomer feed process in which all of said acidic monomer M1 is

B2
Cont'd

present in the monomer feed.

15. (Amended) The emulsion paint according to Claim 9, wherein a pigment volume concentration pvc > 10%.

B3 16. (Amended) A method of improving the wet abrasion resistance of a polymer-bound coating composition, comprising:

mixing the copolymer according to Claim 9 as a binder with said coating composition.

17. (Amended) The method according to Claim 16, wherein the coating composition is an emulsion paint.

Please add the following new Claims.

Sub B3

18. (New) The emulsion paint as claimed in Claim 9, further comprising 0 to 0.5% by weight of a monoethylenically unsaturated monocarboxylic acid selected from the group consisting of acrylic acid and methacrylic acid;

B4 provided that a total amount of said acidic monomer and said monoethylenically unsaturated carboxylic acid is from 0.5 to 1.0 % by weight based on a total weight of said copolymer P; and

provided that a weight ratio of said monoethylenically unsaturated carboxylic acid to said acidic monomer does not exceed 1:1.

19. (New) The emulsion paint as claimed in Claim 9, wherein the aqueous dispersion of the copolymer P is obtained by free-radical aqueous emulsion polymerization of the monomers M using a monomer feed process in which all of the itaconic acid is present in the monomer feed.

20. (New) The emulsion paint as claimed in Claim 9, wherein the aqueous dispersion of the copolymer P is obtained by free-radical aqueous emulsion polymerization of the

monomers M using a monomer feed process in which at least 50% by weight of acidic monomer M1 are present in the monomer feed.

21. (New) The emulsion paint as claimed in Claim 9, wherein the aqueous dispersion of the copolymer P is obtained by free-radical aqueous emulsion polymerization of the monomers M using a monomer feed process in which at least 50% by weight of the itaconic acid are present in the monomer feed.

22. (New) The emulsion paint according to Claim 9, wherein a pigment volume concentration $pvc > 40\%$.

23. (New) The emulsion paint according to Claim 9, wherein a pigment volume concentration $pvc > 60\%$.

24. (New) The emulsion paint according to Claim 9, wherein an amount of itaconic acid in said copolymer P is from 0.5 to 0.9 % by weight, based on a total weight of said copolymer P.

25. (New) The emulsion paint according to Claim 9, wherein a weight ratio of said monoethylenically unsaturated carboxylic acid to said itaconic acid does not exceed 1:2.

26. (New) The emulsion paint according to Claim 9, wherein a weight ratio of said monoethylenically unsaturated carboxylic acid to said itaconic acid does not exceed 1:3.

27. (New) The emulsion paint according to Claim 9, wherein a weight ratio of said monoethylenically unsaturated carboxylic acid to said itaconic acid does not exceed 1:9.

28. (New) The emulsion paint according to Claim 9, further comprising, in copolymerized form, 0 to 1% by weight of monomers M4 which comprise siloxane groups.

29. (New) The emulsion paint according to Claim 28, wherein said monomers M4 are selected from the group consisting of vinyltrialkoxysilanes, alkylvinylalkoxysilanes and (meth)acryloxyalkyltrialkoxysilanes.

30. (New) The emulsion paint according to Claim 9, having a wet abrasion resistance of from 1700 to 4660.

31. (New) The emulsion paint according to Claim 30, having a wet abrasion resistance of from 2800 to 4660.

32. (New) The emulsion paint according to Claim 9, wherein said copolymer P comprises in copolymerized form

i) 20 to 80 % by weight of at least one monomer M2a, whose homopolymer has a glass transition temperature of $>30^{\circ}\text{C}$;

ii) 20 to 79.7 % by weight of at least one monomer M2b, whose homopolymer has a glass transition temperature of $<20^{\circ}\text{C}$;

iii) 0.5 to 1.0 % by weight of itaconic acid as monomer M1; and

iv) 0.2 to 5% by weight of at least one monomer M3 having at least one urea group;

wherein a sum of the amounts of monomers M1, M2a, M2b and M3 is 100% by weight.

33. (New) The emulsion paint according to Claim 32, wherein said monomer M2a is selected from the group consisting of methyl methacrylate, n-butyl methacrylate and styrene; and

wherein said monomer M2b is selected from the group consisting of $\text{C}_1\text{-C}_{12}$ alkylacrylates.

34. (New) A method of improving a wet abrasion resistance of a polymer bound emulsion paint, comprising:

mixing an aqueous dispersion of a copolymer P as a binder into a latex paint which additionally comprises at least one inorganic pigment, an inorganic filler/extender and an auxiliary;

wherein said copolymer P comprises in polymerized form

a) as monomer M 1:

0.5 to 1.0% by weight of an acidic monomer selected from the group consisting of itaconic acid, a salt of itaconic acid an anhydride of itaconic acid and a combination thereof, and

0 to 0.5% by weight of a second monomer selected from the group consisting of acrylic acid and methacrylic acid based on a total weight of said copolymer P;

provided that a total amount of said acidic monomer and said second monomer is from 0.5 to 1.0% by weight, based on the total weight of said copolymer P, and the weight ratio of said second monomer to said acidic monomer does not exceed 1:1;

b) 90 to 99.9 % by weight of monomers M2 selected from the group consisting of vinylaromatic monomers, esters of ethylenically unsaturated C₃-C₈ monocarboxylic acids with C₁-C₁₂-alkanols, and vinyl esters of aliphatic C₁-C₁₂ monocarboxylic acids, based on a total amount of said copolymer P; and

c) 0 to 10 % by weight of at least one monomer M3 which comprises an urea group, based on the total weight of copolymer P; and

wherein said aqueous polymer dispersion contains no polymerized acrolein;

ii) at least one inorganic pigment,

iii) an inorganic filler or an inorganic extender; and

iv) an auxiliary.

35. (New) The method according to Claim 34, wherein said copolymer P is the only binder

36. (New) The method according to Claim 34, wherein said emulsion paint has a pigment volume concentration of >10%.

37. (New) The method according to Claim 34, wherein said emulsion paint has a pigment volume concentration of >40%

38. (New) The method according to Claim 34, wherein said emulsion paint has a pigment volume concentration of >60%.

39. (New) The method according to Claim 34, wherein said copolymer P comprises in copolymerized form

i) 20 to 80 % by weight of at least one monomer M2a, whose homopolymer has a glass transition temperature of >30°C;

ii) 20 to 79.7 % by weight of at least one monomer M2b, whose homopolymer has a glass transition temperature of <20°C;

iii) 0.5 to 1.0 % by weight of itaconic acid as monomer M1; and

iv) 0.2 to 5% by weight of at least one monomer M3 having at least one urea group;

wherein a sum of the amounts of monomers M1, M2a, M2b and M3 is 100% by weight.

40. (New) The method according to Claim 34, wherein a wet abrasion resistance of from 1700 to 4660 is achieved.

41. (New) The method according to Claim 34, wherein a wet abrasion resistance of from 2800 to 4660 is achieved.

42. (New) An emulsion paint, comprising:

i) a polymeric binder, which comprises at least one copolymer P of ethylenically unsaturated monomers M in the form of an aqueous polymer dispersion;

wherein said copolymer P has a glass transition temperature T_g in the range of from

-10 to +50°C; and

wherein said copolymer P comprises in polymerized form

a) as monomer M 1:

0.5 to 1.0% by weight of an acidic monomer selected from the group consisting of itaconic acid, a salt of itaconic acid an anhydride of itaconic acid and a combination thereof, and

0 to 0.5% by weight of a second monomer selected from the group consisting of acrylic acid and methacrylic acid based on a total weight of said copolymer P;

provided that a total amount of said acidic monomer and said second monomer is from 0.5 to 1.0% by weight, based on the total weight of said copolymer P, and the weight ratio of said second monomer to said acidic monomer does not exceed 1:1;

b) 90 to 99.9 % by weight of monomers M2 selected from the group consisting of vinylaromatic monomers, esters of ethylenically unsaturated C₃-C₈ monocarboxylic acids with C₁-C₁₂-alkanols, and vinyl esters of aliphatic C₁-C₁₂ monocarboxylic acids, based on a total amount of said copolymer P; and

c) 0 to 10 % by weight of at least one monomer M3 which comprises an urea group, based on the total weight of copolymer P; and

wherein said aqueous polymer dispersion contains no polymerized acrolein;

ii) at least one inorganic pigment,

iii) an inorganic filler or an inorganic extender; and

iv) an auxiliary.

IN THE ABSTRACT

Please delete the abstract in its entirety and insert therefore:

B5 The wet abrasion resistance of polymer-bound pigmented coating compositions is improved by pigment-containing aqueous formulations which contain at least one copolymer P of ethylenically unsaturated monomers M in the form of an aqueous polymer dispersion; wherein the copolymer P has a glass transition temperature T_g in the range of from -10 to +50°C; and wherein the copolymer P contains in polymerized form a) as monomer M 1: 0.5 to 1.0% by weight of an acidic monomer selected from the group consisting of itaconic acid, a salt of itaconic acid an anhydride of itaconic acid and a combination thereof, and 0 to 0.5% by weight of a second monomer selected from the group consisting of acrylic acid and methacrylic acid based on a total weight of the copolymer P; provided that a total amount of the acidic monomer and the second monomer is from 0.5 to 1.0% by weight, based on the total weight of the copolymer P, and the weight ratio of the second monomer to the acidic monomer does not exceed 1:1; b) 90 to 99.5 % by weight of monomers M2 selected from the group consisting of vinylaromatic monomers, esters of ethylenically unsaturated C_3 - C_8 monocarboxylic acids with C_1 - C_{12} -alkanols, and vinyl esters of aliphatic C_1 - C_{12} monocarboxylic acids, based on a total amount of the copolymer P; and c) 0 to 9.5 % by weight of at least one monomer M3 which contains an urea group, based on the total weight of copolymer P; and wherein the aqueous polymer dispersion contains no polymerized acrolein; ii) at least one inorganic pigment, iii) an inorganic filler or an inorganic extender; and iv) an auxiliary.

BASIS FOR THE AMENDMENT

Claims 12 and 14 have been canceled.

Claims 9-11, 13, 15-17 have been amended to recite proper claim language. The amendment of Claim 9 is further supported by Claim 12 as originally filed and at page 3, lines 7 and 9, at page 4, lines 12 and 24 and at page 7, line 11.

Claims 18-42 have been added.

New Claim 18 is supported by Claim 1 as originally filed and at page 3, lines 13 ff.

New Claims 19-21 are supported at page 8, line 21 to page 12, line 20.

New Claims 22, 23 and 36-38 are supported at page 13, lines 7 to 13.

New Claim 24 is supported at page 3, line 9.

New Claims 25-27 are supported at page 3, lines 5-21 and by Example 5.

New Claims 28 and 29 are supported at page 5, lines 1-8.

New Claims 30, 31, 40 and 41 are supported by Tables 3-6 at pages 31 and 32.

New Claim 32 is supported at page 3, lines 5-21 and at page 6, line 43 to page 7, line 21.

New Claim 33 is supported at page 6, lines 24-41.

New Claim 34 is supported by Claims 9 and 16 as originally filed and at page 3, lines 7 and 9, at page 4, lines 12 and 24 and at page 7, line 11.

New Claim 35 is supported by Claim 1 as originally filed.

New Claim 39 is supported at page 6, line 43 to page 7, line 21.

New Claim 42 is supported by Claim 9 as originally filed and at page 3, lines 7 and 9, at page 4, lines 12 and 24 and at page 7, line 11. In addition, the acidic monomers M1 have been defined as supported at page 3, line 13 of the specification and by Claim 1 as originally filed.

The abstract of the disclosure has been amended as supported by the specification.

No new matter is believed to have been added by entry of this amendment. Entry and

favorable reconsideration are respectfully requested.

Upon entry of this amendment Claims 9-11, 13 and 15-42 will now be active in this application.

REQUEST FOR RECONSIDERATION

Applicants wish to thank Examiner Egwim for his helpful and courteous discussion with Applicants' Representative on August 14, 2002. During this discussion it was noted that one way to overcome the rejections over Plamondon et al and Baumstark et al (U.S. 5,905,114) is to include the limitation of Claim 12 in Claim 9. In addition, it was suggested to overcome the rejections over Plamondon et al; Knutson; Fölsch et al; Dèsor et al; and Farwaha et al by including siloxane containing monomers M4, as supported at page 5, lines 1-8 of the specification. Applicants have amended Claim 9 to include the limitation of Claim 12 as discussed. In addition, the amounts of the acidic monomer M1, and the monomer M2 have been limited to 0.5-1.0 wt% and 90-99.9 wt%, respectively. In regard to the siloxane containing monomers M4, Applicants have added new Claims 28 and 29 which contain allowable subject matter.

Applicants respectfully request reconsideration of the application, as amended, in view of the following remarks.

The rejection of Claims 9-11 and 13-17 under 35 U.S.C. §102(b) as anticipated by Plamondon et al is respectfully traversed.

Conventional binders for emulsion paints contain acrylic acid or methacrylic acid as acidic monomers in polymerized form. The inventors of the present invention surprisingly found that the wet abrasional resistance of coatings obtained from emulsion paints can be dramatically improved by incorporating a specific amount of itaconic acid into the polymeric

binder instead of acrylic acid or methacrylic acid. In a preferred embodiment, the amount of polymerized itaconic acid in the binder is 0.5 to 1.0% by weight based on the weight of the copolymer (see Claims 9 and 42). Surprisingly, a part, but not more than 50% of the itaconic acid may be replaced by acrylic acid or methacrylic acid without losing this advantage (see Claims 18 and 42). These findings are demonstrated in the working examples of the present application, especially in Tables 3 to 5 on pages 31 ff. The advantage is most striking for emulsion paints containing high amounts of pigment (pvc > 40%, see discussion on page 2, lines 19 to 23; page 10, lines 10 to 13).

Thus, the present invention as set forth in amended Claim 9 and new Claim 42 relate to an emulsion paint. Notably, the emulsion paint comprises a copolymer P comprising inter alia in polymerized form

a) 0.5 to 1.0% by weight of an acidic monomer M1 selected from the group consisting of itaconic acid, a salt of itaconic acid an anhydride of itaconic acid and a combination thereof, based on a total weight of said copolymer P

c) 0.1 to 10% by weight of at least one monomer M3 comprising an urea group, based on the total weight of said copolymer P.

The present invention as set forth in amended Claim 16 relates to a method of improving the wet abrasion resistance of a polymer-bound coating composition, comprising: mixing the copolymer according to Claim 9 as a binder with said coating composition.

New Claim 34 relates to a method of improving a wet abrasion resistance of a polymer bound emulsion paint, using a copolymer P as set forth in Claim 42.

Plamondon et al discloses a method for treating a textile material with an aqueous thermosetting acrylic latex. This latex requires at least 0.5% by weight of a graftlinking

monomer or an active crosslinking monomer (Plamondon et al, col. 3, line 7). Both, the active crosslinking monomer and the graftlinking monomer contain at least to addition polymerizable vinylidene groups as can be seen from col. 4, line 13 and line 41 ff. However, there is no disclosure or suggestion of 0.1 to 10% by weight of at least one monomer M3 comprising an urea group as claimed. Therefore, Plamondon et al does not anticipate the claimed subject matter.

Therefore, the rejection of Claims 9-11 and 13-17 under 35 U.S.C. §102(b) as anticipated by Plamondon et al is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

The rejection of Claims 9-11 and 13-17 under 35 U.S.C. §102(e) as anticipated by Baumstark et al is respectfully traversed.

Baumstark et al (US 5,905,114) disclose binders having up to 1 % by weight of ethylenically unsaturated monomers which are able to form ionic groups (Baumstark et al, col. 3, line 50 ff.). A large number of ionic monomers are mentioned. However, there is no disclosure or suggestion of 0.1 to 10% by weight of at least one monomer M3 comprising an urea group as claimed.

Therefore, the rejection of Claims 9-11 and 13-17 under 35 U.S.C. §102(e) as anticipated by Baumstark et al is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

The rejection of Claims 9-17 under 35 U.S.C. §102(b) as anticipated by Fölsch et al or Dèsor et al is respectfully traversed.

The binders of Dèsor et al may contain in particular from 0.5 to 5% by weight of monoolefinically unsaturated mono- and/or dicarboxylic acids and their amides or N-substituted amide (Dèsor et al, col. 2, lines 51 to 59). Dèsor et al neither recognizes the

importance of itaconic acid nor the importance of a specific amount of itaconic acid. As can be seen from the examples, conventional binders such as Movilith DM611 or Movilith

VDM7410 are used. Furthermore, in column 2, line 51-59 it is stated that the polymers

preferably contain acidic monomers, their amides or their N-substituted amides without giving a preference to acidic monomers. In other words, Dèsor et al regards these monomers to be equivalent. However, this is not the case as can be seen from the working examples of the claimed invention. The working examples of Dèsor et al do not give any hint whether or not the polymers contain acidic monomers. Thus, there is no disclosure or suggestion of to use itaconic acid in the claimed amount of 0.5 to 1.0 wt% to improve wet abrasion resistance.

The Examples of the present invention demonstrate that both, the selection of itaconic acid and the amount of itaconic acid result in superior properties (wet abrasion resistance) of the emulsion paints. For example, in Table 3 at page 31 of the present invention, comparative Example C1 uses methacrylic acid and achieves a low wet abrasion resistance of only 1200, while Examples 1 and 2 use 1 wt% of itaconic acid and achieve a high wet abrasion resistance of 2000 and 1700, respectively. Furthermore, even if itaconic acid is used, but the amount is outside the claimed range, such as in comparative Examples C2 and C3, a low wet abrasion resistance of only 1000 and 1325, respectively can be achieved.

Similar arguments apply to Fölsch et al. The binders of Fölsch et al require preferably 0.1 to 5% by weight of ethylene-unsaturated radically polymerizable carboxylic acids (Fölsch et al, col. 4, line 49 ff.). Even though itaconic acid is mentioned, it appears in a long list of monomers and there is no motivation to use itaconic acid in the claimed amount to improve wet abrasion resistance. Fölsch et al does not recognize the importance of using a specific amount of itaconic acid or of using the itaconic acid itself. Instead, Fölsch et al uses methacrylic acid as can be seen from the only example in col. 6, line 27. Furthermore, the

superior results of using the claimed amount of itaconic acid have been discussed above.

In particular, a method for improving wet abrasion resistance as claimed in Claims 16 and 34 is not disclosed or suggested by Fölsch et al or Dèsor et al.

Therefore, the rejection of Claims 9-17 under 35 U.S.C. §102(b) as anticipated by Fölsch et al or Dèsor et al is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

The rejection of Claims 9-17 under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Knutson or Farwaha et al is respectfully traversed.

Knutson disclose a long list of acidic monomers which includes itaconic acid (Knutson, col. 4, lines 24-39). Methacrylic acid is given as the most preferred acidic comonomer. Thus, Knutson believes that all acidic monomers are equally effective. That this is not the case has been discussed above. Clearly, the claimed amount of itaconic acid results in superior wet abrasion resistance which is not at all disclosed or suggested by this reference. There is no motivation to use itaconic acid in the claimed amount to improve wet abrasion resistance.

Farwaha et al disclose a long list of carboxylic acid monomers which includes itaconic acid (Farwaha et al, col. 3, lines 23-28). Thus, Farwaha et al believes that all acidic monomers are equally effective. That this is not the case has been discussed above. Clearly, the claimed amount of itaconic acid results in superior wet abrasion resistance which is not at all disclosed or suggested by this reference. There is no motivation to use itaconic acid in the claimed amount to improve wet abrasion resistance.

In particular, a method for improving wet abrasion resistance as claimed in Claims 16 and 34 is not disclosed or suggested by Knutson or Farwaha et al.

Therefore, the rejection of Claims 9-17 under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Knutson or Farwaha et al is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

Finally, Applicants wish to point out that new Claims 28 and 29 contain allowable subject matter.

In addition, Claims 22, 23, 37 and 38 contain allowable subject matter. The only reference that discloses a pvc of >40% is Baumstark et al. However this reference does not disclose the urea group containing monomers (Baumstark et al., col. 7, lines 41-43). Further, Dèsor et al discloses a pigment volume concentration of < 40% (Dèsor et al., col. 5, lines 13-16) and discloses a pvc of 18% in Example 4 (Dèsor et al., col. 6, line 49).

The rejection of Claims 9-17 under 35 U.S.C. §112, 2nd paragraph, is obviated by the amendment of these Claims. In Claim 9, the phrases “such as”, “it being possible” and “if desired” have been deleted. In Claim 13, the term “obtainable” has been replaced by “obtained.” In Claim 15, the definition of the pigment volume concentration has been deleted. The rejection of Claim 14 under 35 U.S.C. §112, 2nd paragraph, is moot in view of the cancellation of this Claim. Claims 16 and 17 have been rewritten as method claims.

The rejection of Claims 16 and 17 under 35 U.S.C. §101, is obviated by the amendment of these Claims which have been rewritten as method claims.

The objection to the abstract is obviated by the new abstract. A copy of the new abstract has been provided on a separate sheet, attached herewith.

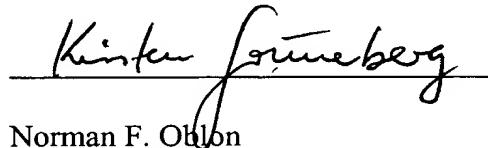
Applicants hereby submit an Information Disclosure Statement citing inter alia references DE 19542077 and EP 0810274 because the Examiner indicated that he did not receive these references. English abstracts are provided as well. The Examiner is

respectfully requested to consider these references.

Applicants submit that the present application is now in condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

A handwritten signature in cursive script, appearing to read "Norman F. Ohlson", written over a horizontal line.

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